COSEL

参考資料

TEST DATA OF TUHS5F12

Regulated DC Power Supply
February 28, 2014

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COSEL CO.,LTD.

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CONTENTS

1.Input Current (by Load Current) ・・・・・・・・・・・・・・・・・・・・・・・・ 1
2.Input Power (by Load Current) ・・・・・・・・・・・・・・・・・・・・・・・・ 2
3.Efficiency (by Input Voltage) ・・・・・・・・・・・・・・・・・・・・・・・・ 3
4.Efficiency (by Load Current) ・・・・・・・・・・・・・・・・・・・・・・・・ 4
5.Power Factor (by Input Voltage) ・・・・・・・・・・・・・・・・・・・・・・・ 5
6.Power Factor (by Load Current) ・・・・・・・・・・・・・・・・・・・・・・・ 6
7.Inrush Current ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 7
8.Leakage Current ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 8
9.Line Regulation ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 9
10.Load Regulation ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 10
11.Dynamic Load Response ・・・・・・・・・・・・・・・・・・・・・・・・・・ 11
12.Ripple Voltage (by Load Current) ・・・・・・・・・・・・・・・・・・・・・・ 12
13.Ripple-Noise ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 13
14.Ripple Voltage (by Ambient Temperature) ・・・・・・・・・・・・・・・・・・ 14
15.Ambient Temperature Drift ・・・・・・・・・・・・・・・・・・・・・・・・・ 15
16.Output Voltage Accuracy ・・・・・・・・・・・・・・・・・・・・・・・・・・ 16
17.Time Lapse Drift ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 17
18.Rise and Fall Time ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 18
19.Hold-Up Time ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 19
20.Instantaneous Interruption Compensation ・・・・・・・・・・・・・・・・・・ 20
21.Minimum Input Voltage for Regulated Output Voltage ・・・・・・・・・・・・ 21
22.Overcurrent Protection ・・・・・・・・・・・・・・・・・・・・・・・・・・ 22
23.Overvoltage Protection ・・・・・・・・・・・・・・・・・・・・・・・・・・ 23
24.Figure of Testing Circuitry ・・・・・・・・・・・・・・・・・・・・・・・・ 24

(Final Page 25)

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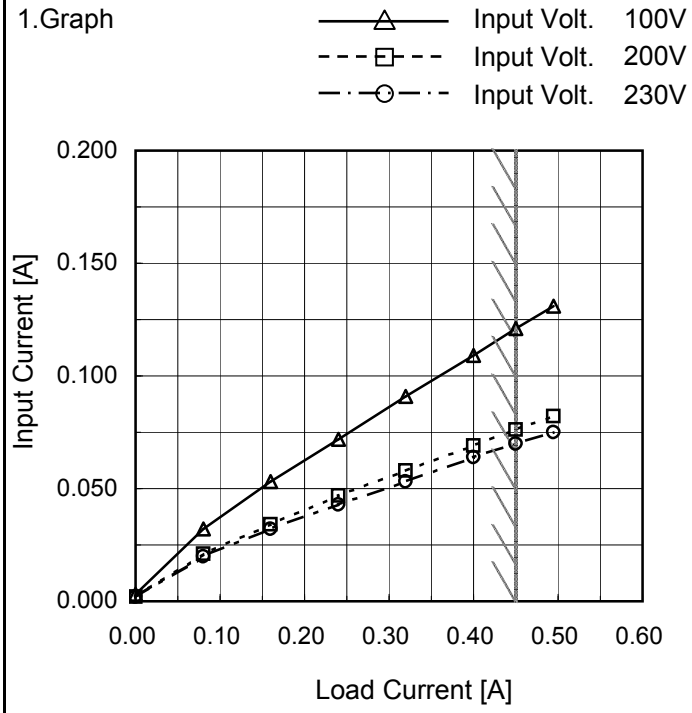
Model	TUHS5F12
Item	Input Current (by Load Current)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated load current.

2.Values

Load Current [A]	Input Current [A]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	0.003	0.002	0.002
0.08	0.032	0.021	0.020
0.16	0.053	0.034	0.032
0.24	0.072	0.047	0.043
0.32	0.091	0.058	0.053
0.40	0.109	0.069	0.064
0.45	0.121	0.076	0.070
0.50	0.131	0.082	0.075
--	-	-	-
--	-	-	-
--	-	-	-

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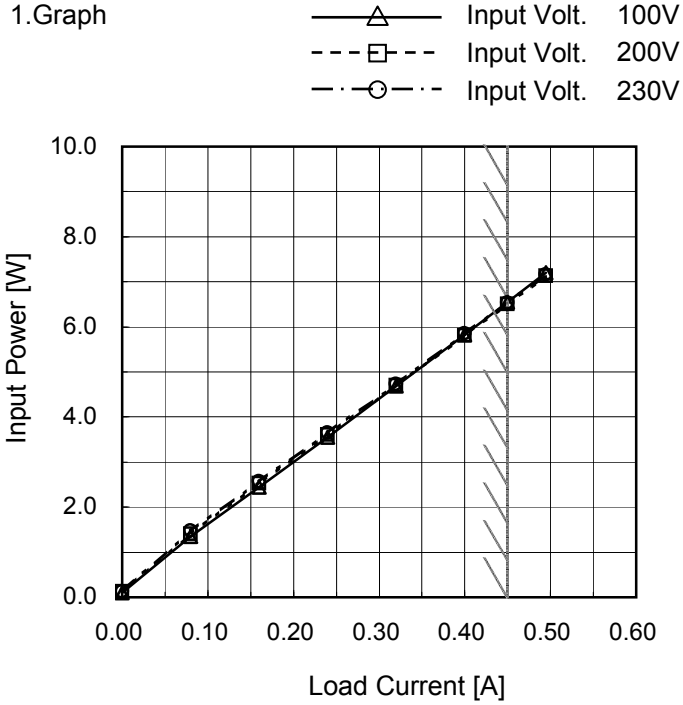
Model	TUHS5F12
Item	Input Power (by Load Current)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated load current.

2.Values

Load Current [A]	Input Power [W]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	0.10	0.13	0.12
0.08	1.35	1.41	1.48
0.16	2.44	2.53	2.56
0.24	3.56	3.62	3.65
0.32	4.68	4.70	4.74
0.40	5.82	5.81	5.85
0.45	6.55	6.51	6.54
0.50	7.21	7.13	7.16
--	-	-	-
--	-	-	-
--	-	-	-

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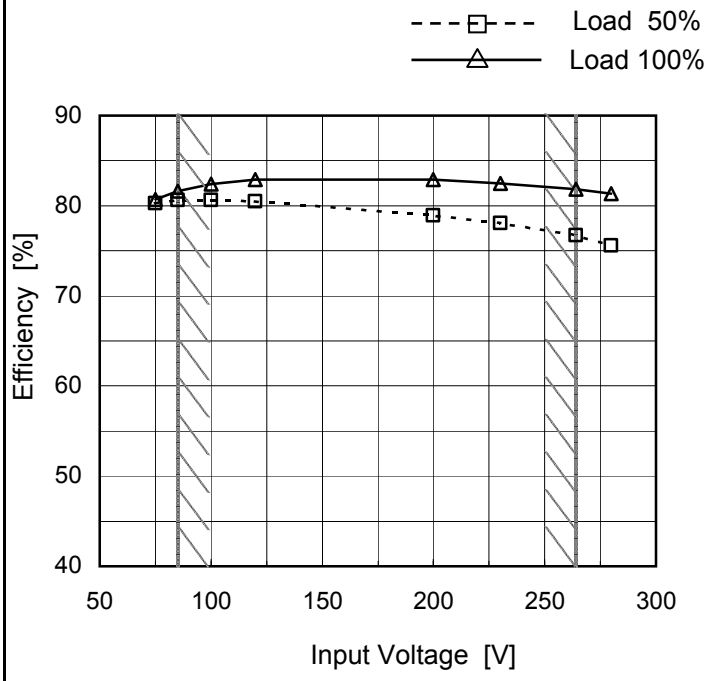
Model	TUHS5F12
Item	Efficiency (by Input Voltage)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated input voltage.

2.Values

Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
75	80.3	80.7
85	80.6	81.6
100	80.6	82.4
120	80.5	82.9
200	78.9	82.9
230	78.1	82.5
264	76.7	81.8
280	75.6	81.3
--	-	-

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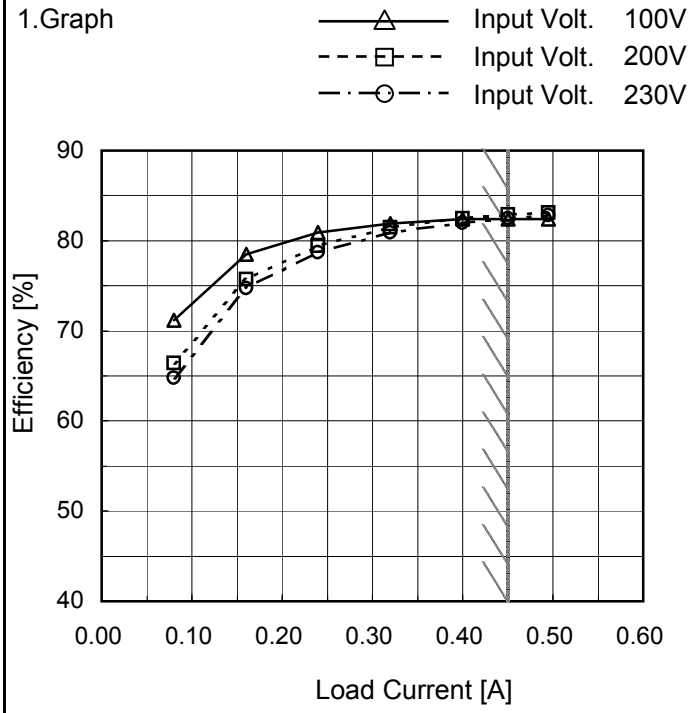
Model	TUHS5F12
Item	Efficiency (by Load Current)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated load current.

2.Values

Load Current [A]	Efficiency [%] Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	-	-	-
0.08	71.2	66.4	64.8
0.16	78.5	75.7	74.7
0.24	80.9	79.4	78.7
0.32	81.9	81.5	80.9
0.40	82.4	82.5	82.0
0.45	82.4	82.9	82.5
0.50	82.4	83.1	82.8
--	-	-	-
--	-	-	-
--	-	-	-

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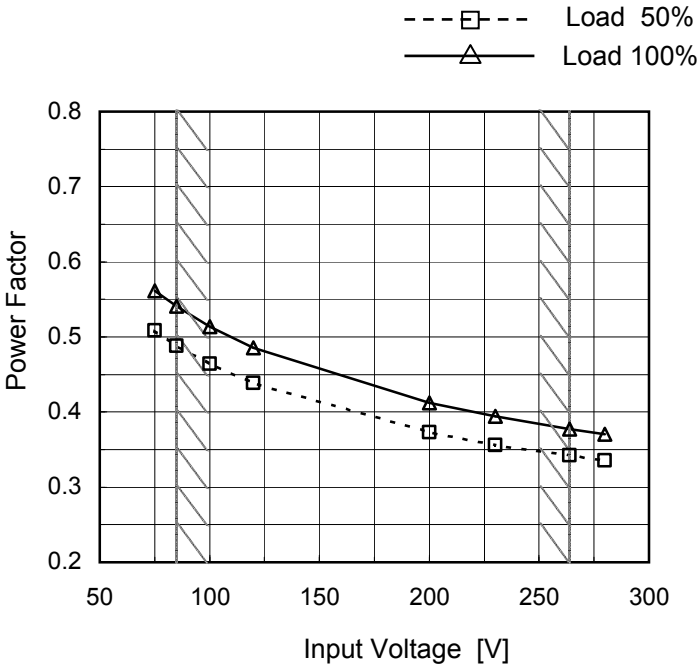
Model	TUHS5F12
Item	Power Factor (by Input Voltage)
Object	――――――――――

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated input voltage.

2.Values

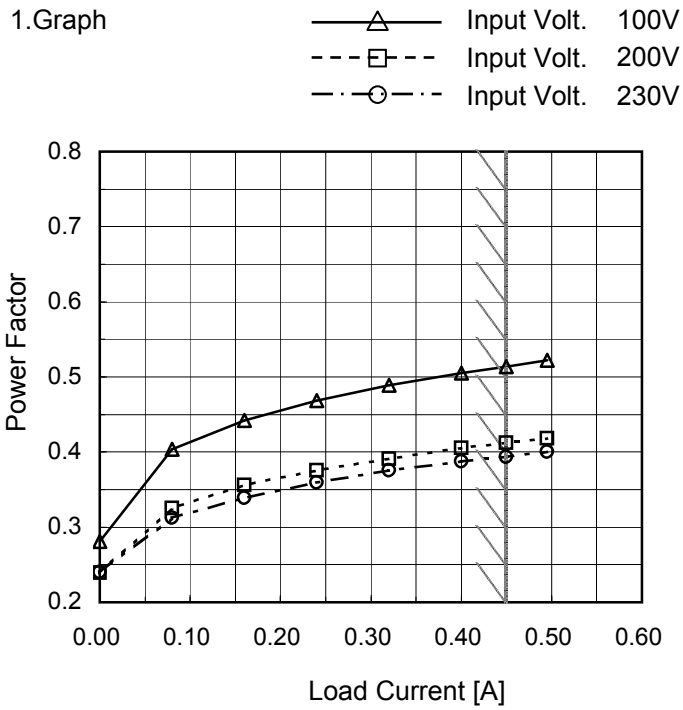
Input Voltage [V]	Power Factor	
	Load 50%	Load 100%
75	0.508	0.561
85	0.488	0.541
100	0.464	0.514
120	0.438	0.486
200	0.373	0.412
230	0.356	0.394
264	0.342	0.377
280	0.336	0.370
--	-	-

COSEL

Model	TUHS5F12
Item	Power Factor (by Load Current)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated load current.

2.Values

Load Current [A]	Power Factor Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	0.281	0.239	0.240
0.08	0.404	0.326	0.313
0.16	0.442	0.356	0.339
0.24	0.469	0.376	0.360
0.32	0.489	0.391	0.376
0.40	0.505	0.406	0.387
0.45	0.514	0.412	0.394
0.50	0.522	0.418	0.400
--	-	-	-
--	-	-	-
--	-	-	-

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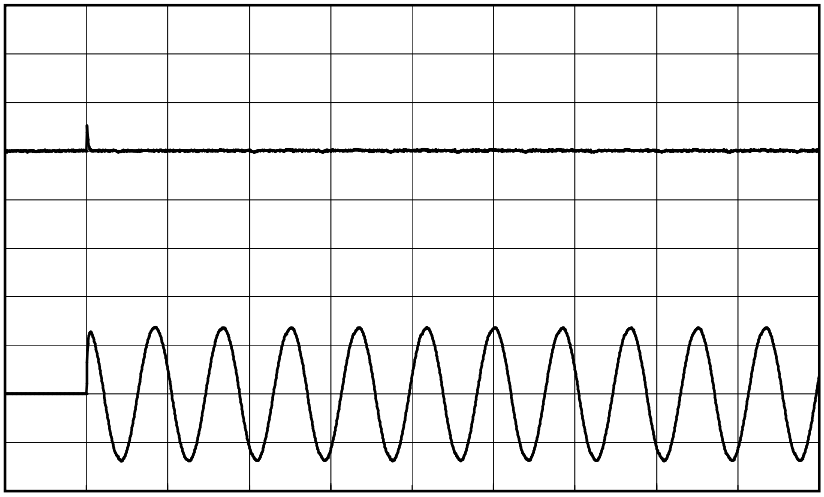
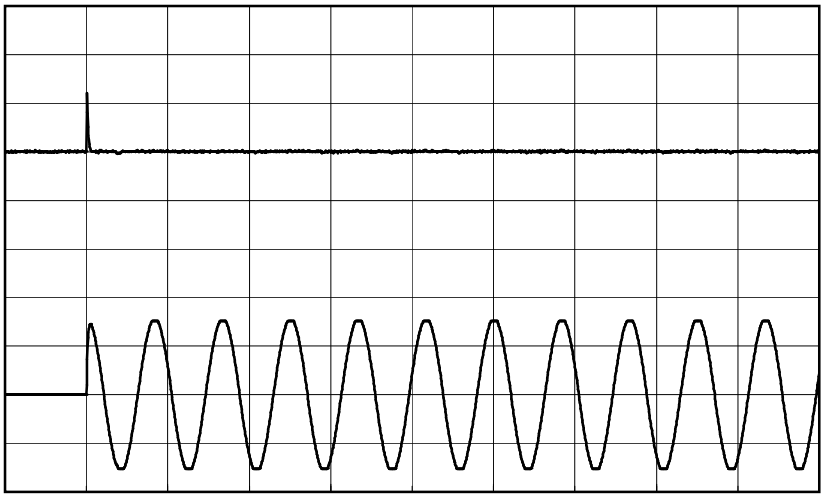
Model	TUHS5F12
Item	Inrush Current
Object	————————

Temperature 25°C
Testing Circuitry Figure A



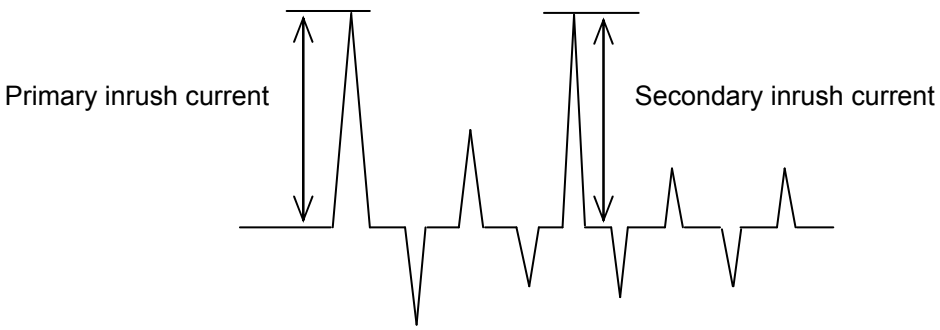
Input Voltage 100 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
10.3 A
Secondary inrush current :
0.8 A



Input Voltage 230 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
24.1 A
Secondary inrush current :
0.7 A



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Model	TUHS5F12	
Item	Leakage Current	Temperature 25°C Testing Circuitry Figure B
Object	――――――――――	

1.Results

[mA]

Standards		Input Volt.			Note
		100 [V]	200 [V]	230 [V]	
DEN-AN	Both phases	0.004	0.005	0.005	Operation
	One of phases	0.003	0.007	0.008	Stand by
IEC60950-1	Both phases	0.002	0.004	0.004	Operation
	One of phases	0.003	0.006	0.007	Stand by

The value for "One of phases" is the reference value only.

2.Condition

Leakage current value is concluded after measuring both phases of AC input and by choosing the larger one.
There is no FG in TUHS series and it is a reinforced insulation power supply of the class 2.

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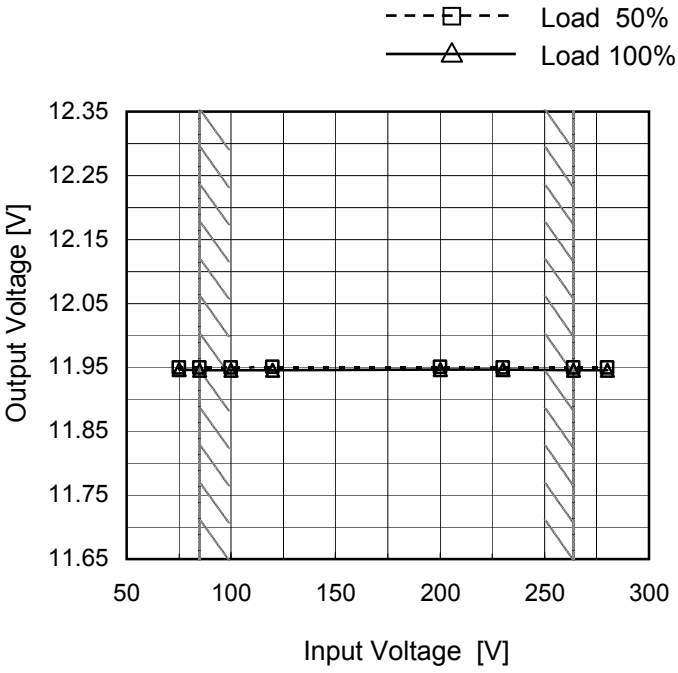
Model	TUHS5F12
Item	Line Regulation
Object	+12V0.45A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated input voltage.

2.Values

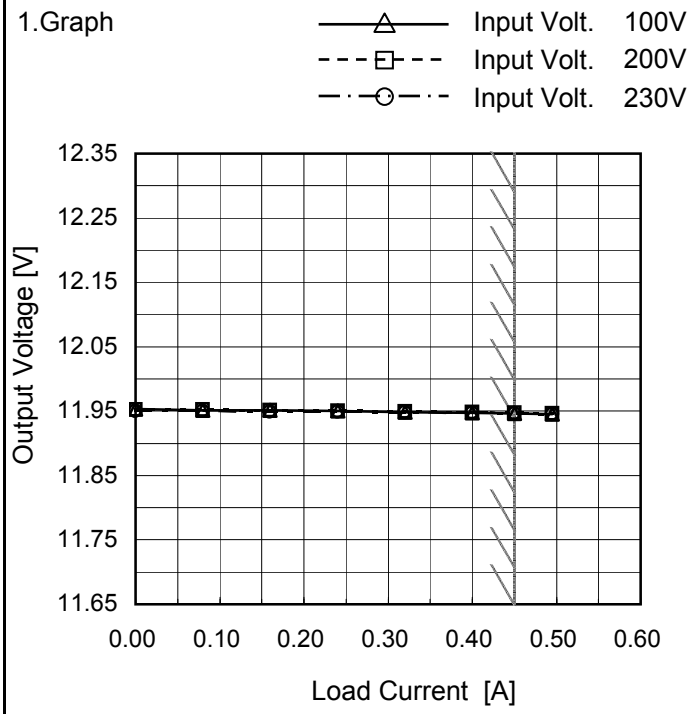
Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
75	11.949	11.946
85	11.950	11.946
100	11.950	11.946
120	11.950	11.946
200	11.950	11.947
230	11.950	11.946
264	11.949	11.946
280	11.949	11.946
--	-	-

COSEL

Model	TUHS5F12
Item	Load Regulation
Object	+12V0.45A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated load current.

2.Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	11.953	11.952	11.950
0.08	11.951	11.952	11.950
0.16	11.951	11.951	11.950
0.24	11.950	11.950	11.950
0.32	11.949	11.949	11.949
0.40	11.947	11.948	11.947
0.45	11.946	11.947	11.946
0.50	11.945	11.946	11.945
--	-	-	-
--	-	-	-
--	-	-	-

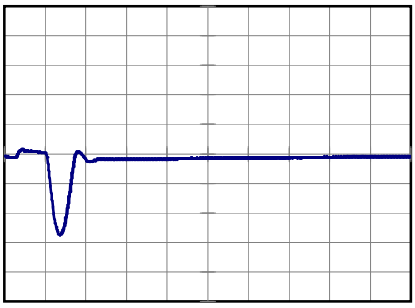
Model	TUHS5F12		
Item	Dynamic Load Response	Temperature Testing Circuitry	25℃ Figure A
Object	+12V 0.45A		

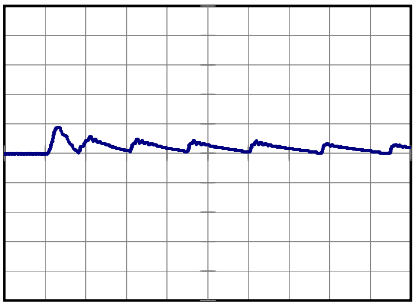
Input Volt. 230V
Cycle 500ms

Load Current

0.45A / 100us

Min.Load (0A)←→
Load 100%(0.45A)



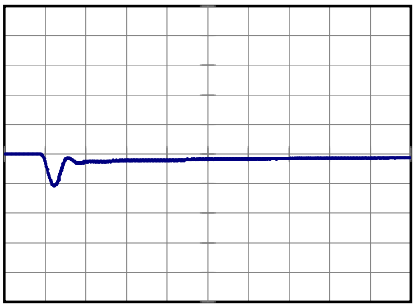


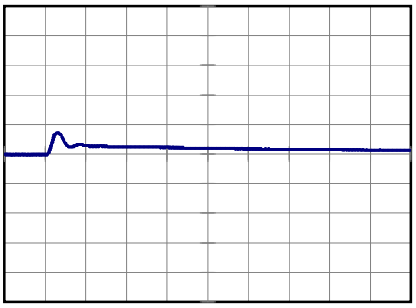
500 mV/div

200 us/div

200 us/div

Load 20% (0.09A)←→
Load 100%(0.45A)



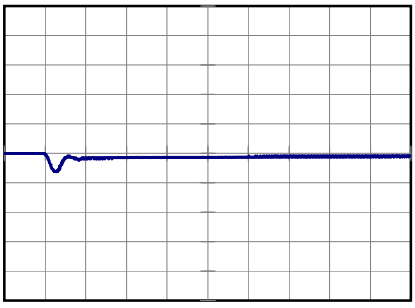


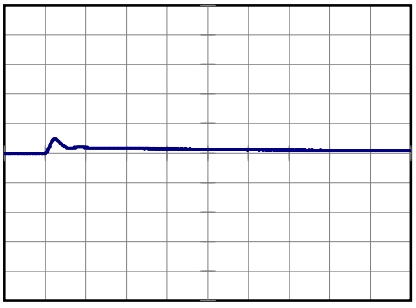
500 mV/div

200 us/div

200 us/div

Load 50% (0.225A)←→
Load 100% (0.45A)





500 mV/div

200 us/div

200 us/div

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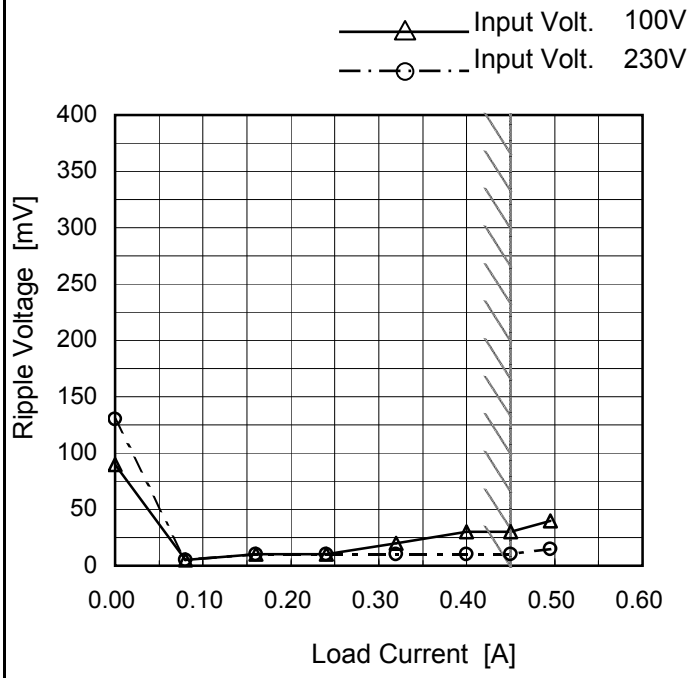
Model	TUHS5F12
Item	Ripple Voltage (by Load Current)
Object	+12V0.45A

Temperature 25°C
Testing Circuitry Figure C

1.Graph



Measured by 100 MHz Oscilloscope.
Ripple Voltage is shown as p-p in the figure below.
Note: Slanted line shows the range of the rated load current.

T1: Due to AC Input Line
T2: Due to Switching

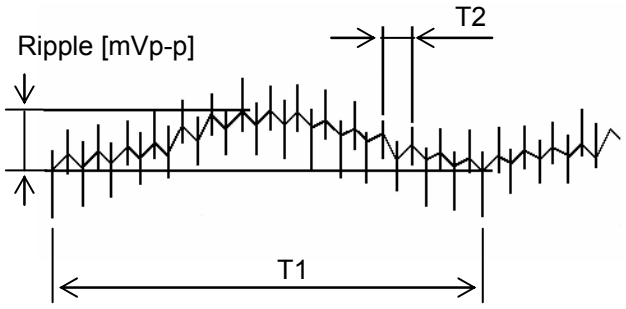


Fig. Complex Ripple Wave Form

2.Values

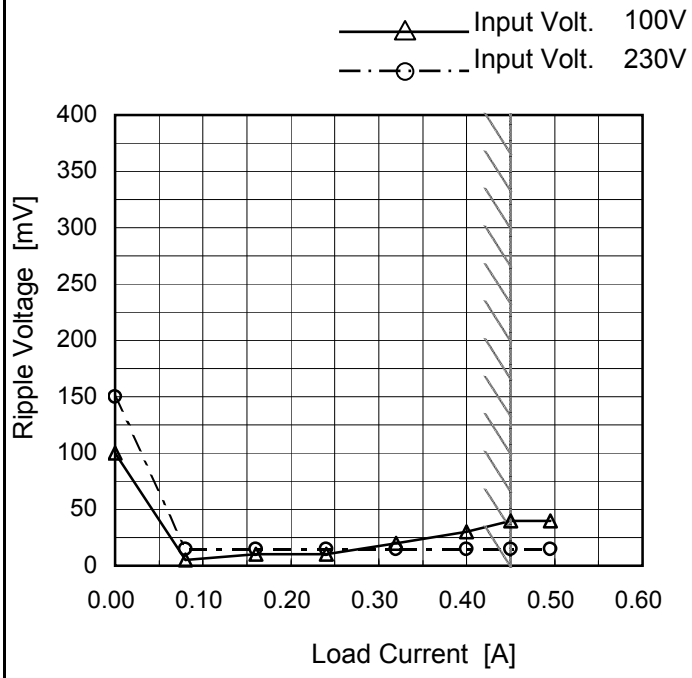
Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 230 [V]
0	90	130
0.08	5	5
0.16	10	10
0.24	10	10
0.32	20	10
0.40	30	10
0.45	30	10
0.50	40	15
--	-	-
--	-	-
--	-	-

COSEL

Model	TUHS5F12
Item	Ripple-Noise
Object	+5V0.45A

Temperature 25°C
Testing Circuitry Figure C

1.Graph



Measured by 100 MHz Oscilloscope.
Ripple-Noise is shown as p-p in the figure below.
Note: Slanted line shows the range of the rated load current.

T1: Due to AC Input Line
T2: Due to Switching

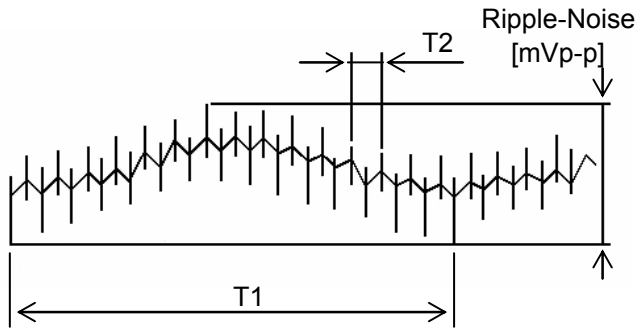


Fig. Complex Ripple Wave Form

2.Values

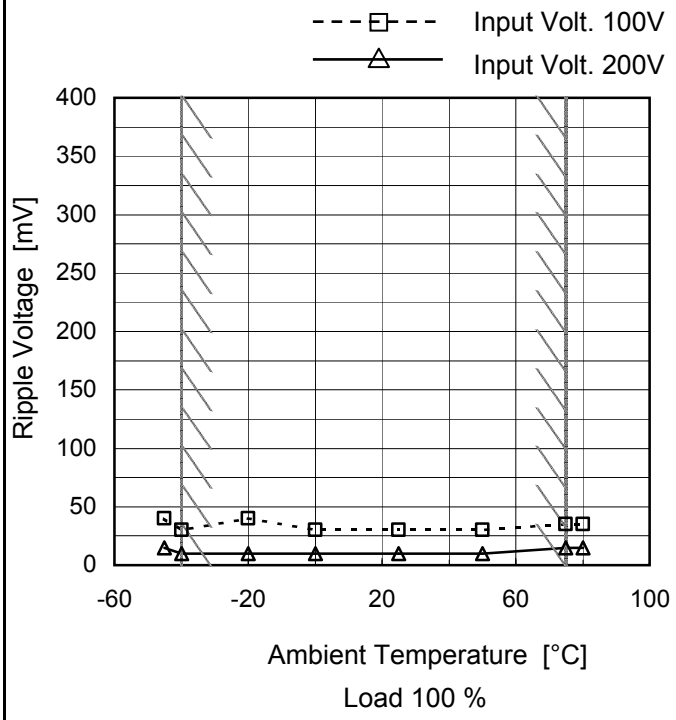
Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 100 [V]	Input Volt. 230 [V]
0	100	150
0.08	5	15
0.16	10	15
0.24	10	15
0.32	20	15
0.40	30	15
0.45	40	15
0.50	40	15
--	-	-
--	-	-
--	-	-

COSEL

Model	TUHS5F12
Item	Ripple Voltage (by Ambient Temp.)
Object	+12V0.45A

Testing Circuitry Figure C

1.Graph



Load 100 %

Measured by 100 MHz Oscilloscope.

Note: Slanted line shows the range of the rated ambient temperature.

2.Values

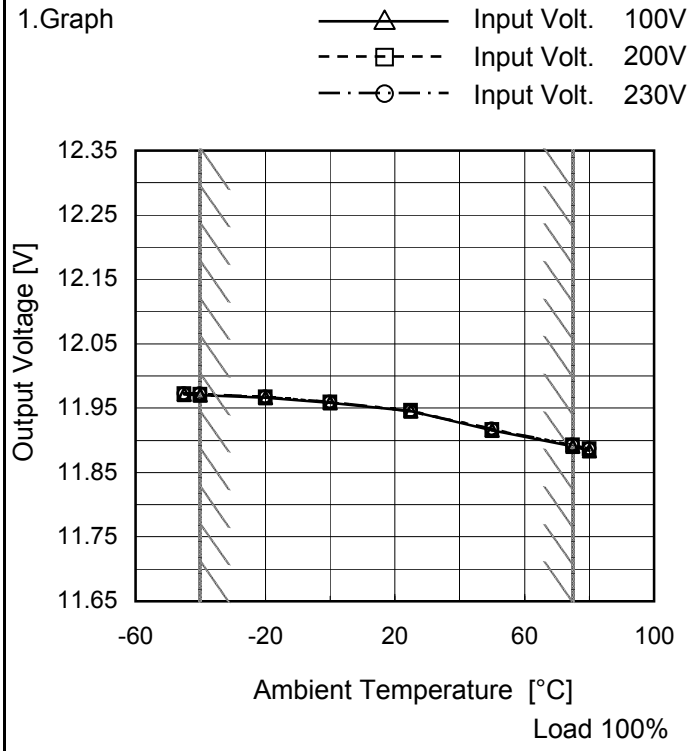
Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 100V	Input Volt. 230V
-45	40	15
-40	30	10
-20	40	10
0	30	10
25	30	10
50	30	10
75	35	15
80	35	15
--	-	-
--	-	-
--	-	-

COSEL

Model	TUHS5F12
Item	Ambient Temperature Drift
Object	+12V0.45A

Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated ambient temperature.

2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
-45	11.971	11.972	11.972
-40	11.971	11.972	11.972
-20	11.966	11.967	11.967
0	11.958	11.960	11.960
25	11.946	11.947	11.946
50	11.916	11.917	11.917
75	11.890	11.892	11.893
80	11.884	11.886	11.887
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	TUHS5F12	
Item	Output Voltage Accuracy	Testing Circuitry Figure A
Object	+12V0.45A	

1.Output Voltage Accuracy

This is defined as the value of the output voltage, regulation load, ambient temperature and input voltage varied at random in the range as specified below.

Temperature : -40 - 75°C
Input Voltage : 85 - 264V
Load Current : 0 - 0.45A

* Output Voltage Accuracy = ±(Maximum of Output Voltage - Minimum of Output Voltage) / 2

$$\text{* Output Voltage Accuracy (Ration)} = \frac{\text{Output Voltage Accuracy}}{\text{Rated Output Voltage}} \times 100$$

2.Values

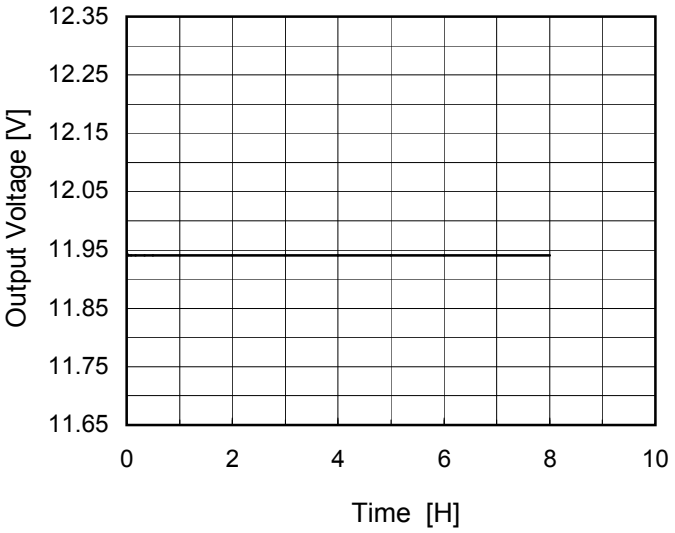
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	-40	85	0	11.974	±48	±0.4
Minimum Voltage	75	85	0.45	11.879		

COSEL

Model	TUHS5F12
Item	Time Lapse Drift
Object	+12V0.45A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Input Volt. 100V
Load 100%

* The characteristic of AC230V is equal.

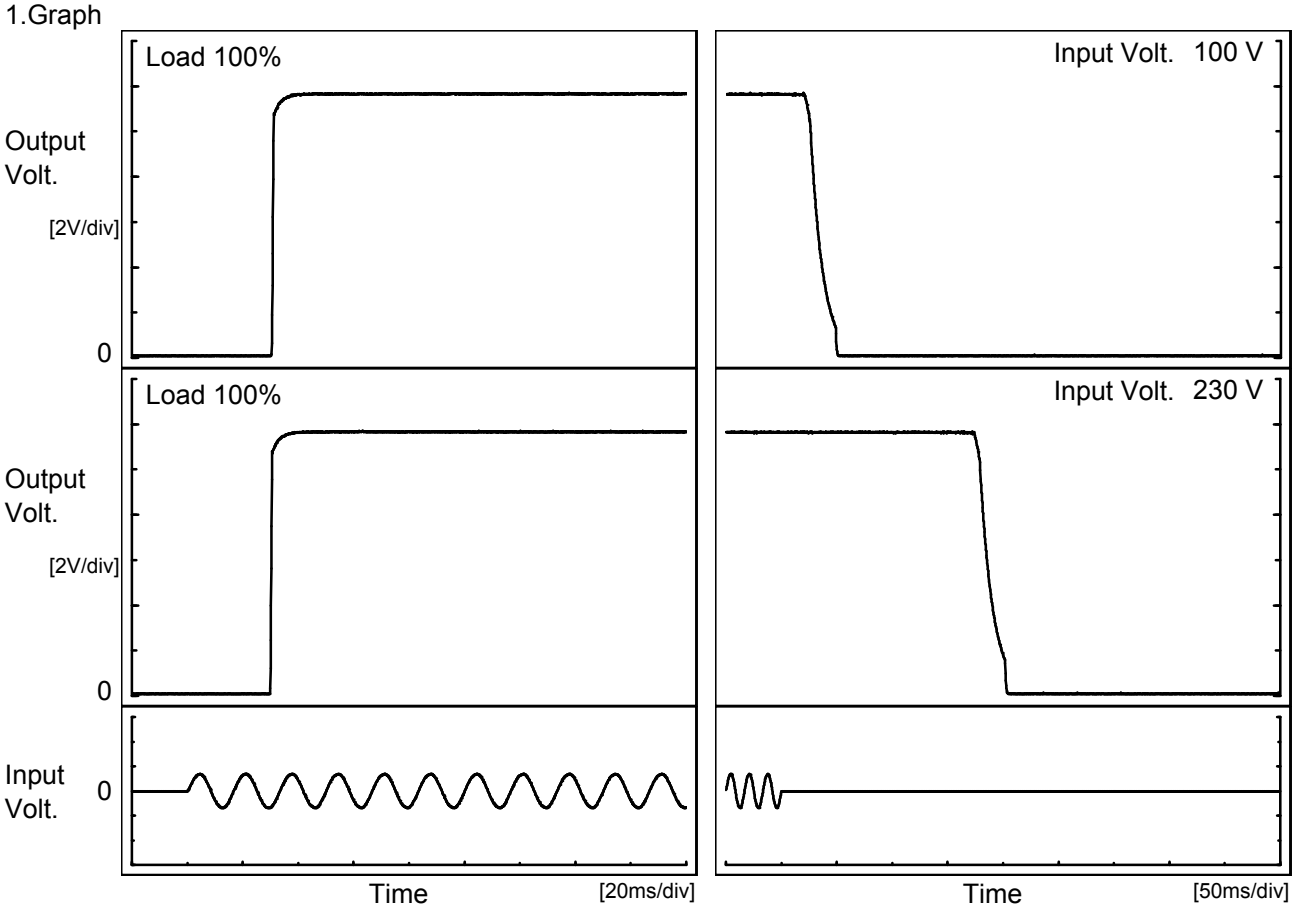
2.Values

Time since start [H]	Output Voltage [V]
0.0	11.946
0.5	11.941
1.0	11.941
2.0	11.941
3.0	11.941
4.0	11.941
5.0	11.941
6.0	11.941
7.0	11.941
8.0	11.941

COSEL

Model	TUHS5F12	
Item	Rise and Fall Time	Temperature 25°C Testing Circuitry Figure A
Object	+12V0.45A	

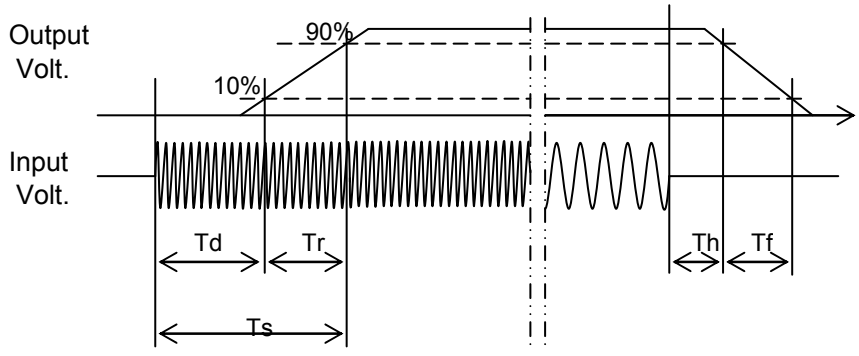
1.Graph



2.Values

[ms]

Input Volt. \ Time	Td	Tr	Ts	Th	Tf
100 V	30.6	1.2	31.8	21.8	24.8
230 V	30.1	1.0	31.1	175.3	24.8

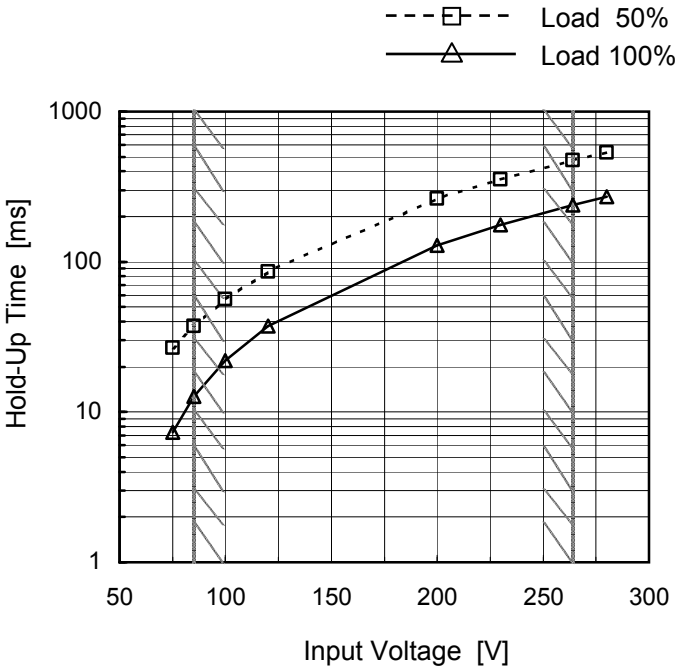


COSEL

Model	TUHS5F12
Item	Hold-Up Time
Object	+12V0.45A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



This duration covers from Shut-off of input voltage to the moment when output voltage descends to the rated range of voltage accuracy.
Note: Slanted line shows the range of the rated input voltage.

2.Values

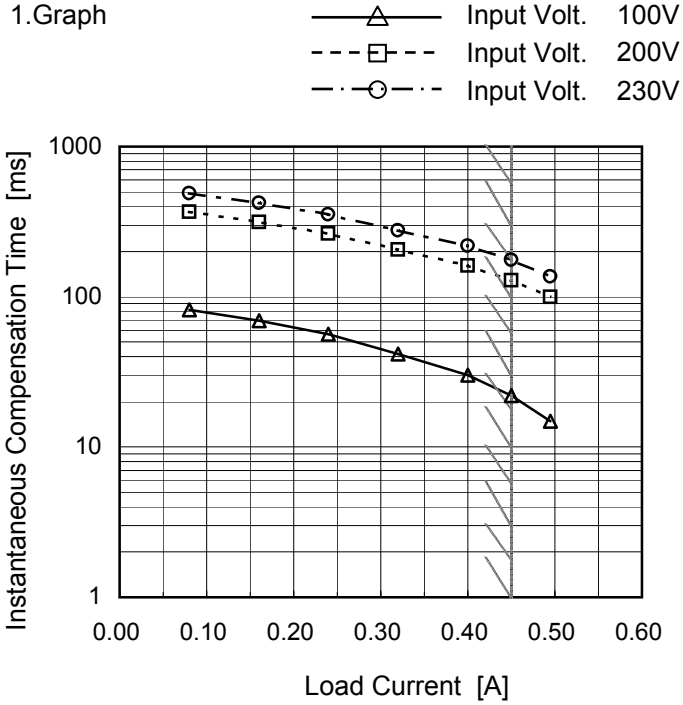
Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
75	27	7
85	38	13
100	56	22
120	86	37
200	264	128
230	354	175
264	474	238
280	536	270
--	-	-

COSEL

Model	TUHS5F12
Item	Instantaneous Interruption Compensation
Object	+12V0.45A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated load current.

2.Values

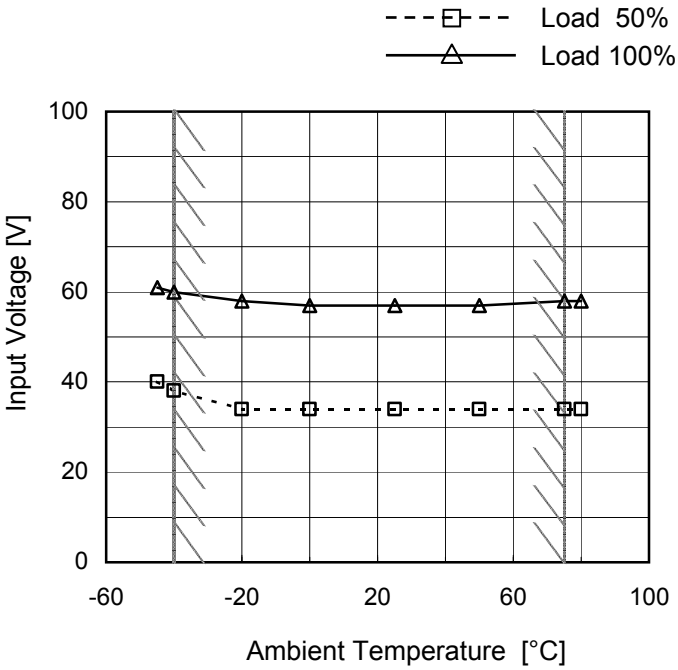
Load Current [A]	Time [ms]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	-	-	-
0.08	82	366	490
0.16	69	315	422
0.24	56	264	354
0.32	42	206	277
0.40	30	161	218
0.45	22	128	175
0.50	15	99	137
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	TUHS5F12
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+12V0.45A

Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated ambient temperature.

2.Values

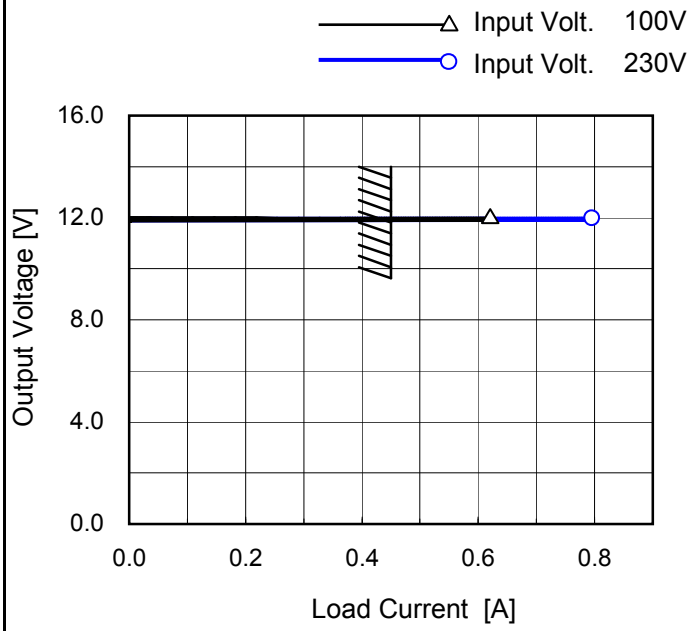
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-45	40	61
-40	38	60
-20	34	58
0	34	57
25	34	57
50	34	57
75	34	58
80	34	58
--	-	-
--	-	-
--	-	-

COSEL

Model	TUHS5F12
Item	Overcurrent Protection
Object	+12V0.45A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated load current.

2.Values

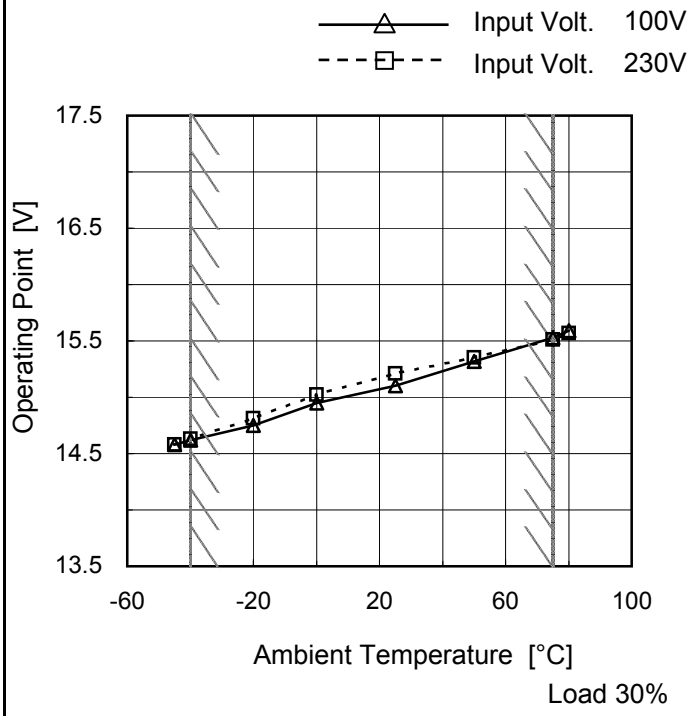
Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 230[V]
12	0.62	0.79
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	TUHS5F12
Item	Overvoltage Protection
Object	+12V0.45A

Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated ambient temperature.

2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 230[V]
-45	14.58	14.58
-40	14.62	14.63
-20	14.75	14.81
0	14.95	15.02
25	15.10	15.21
50	15.32	15.35
75	15.53	15.51
80	15.59	15.57
--	-	-
--	-	-
--	-	-

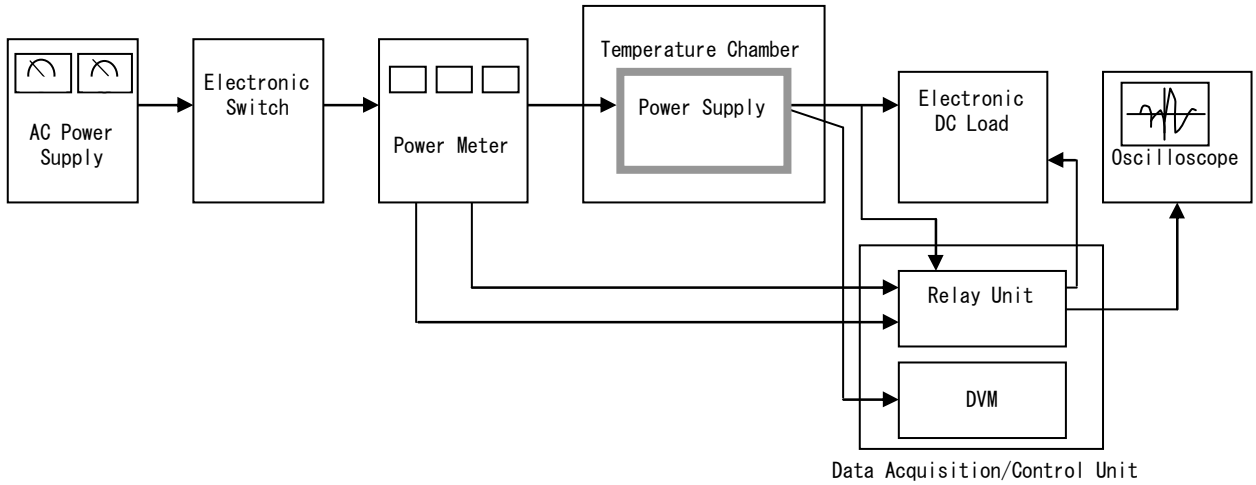


Figure A

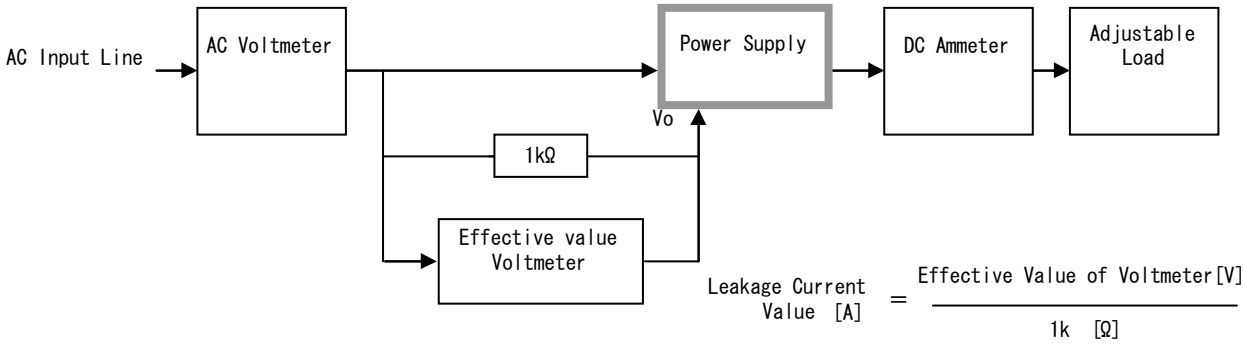


Figure B (DEN-AN)

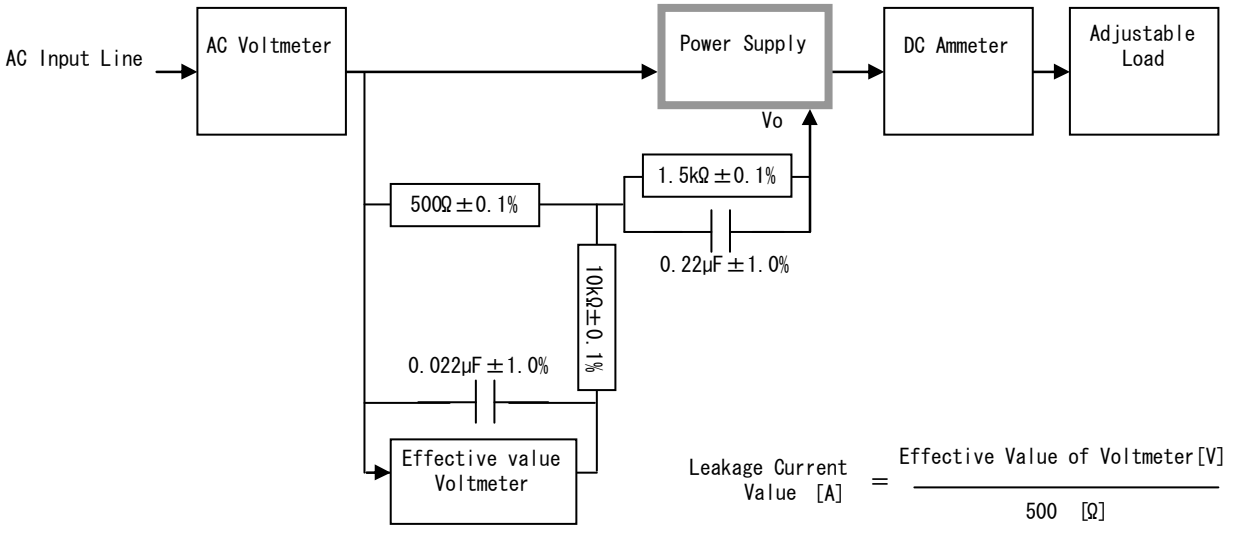
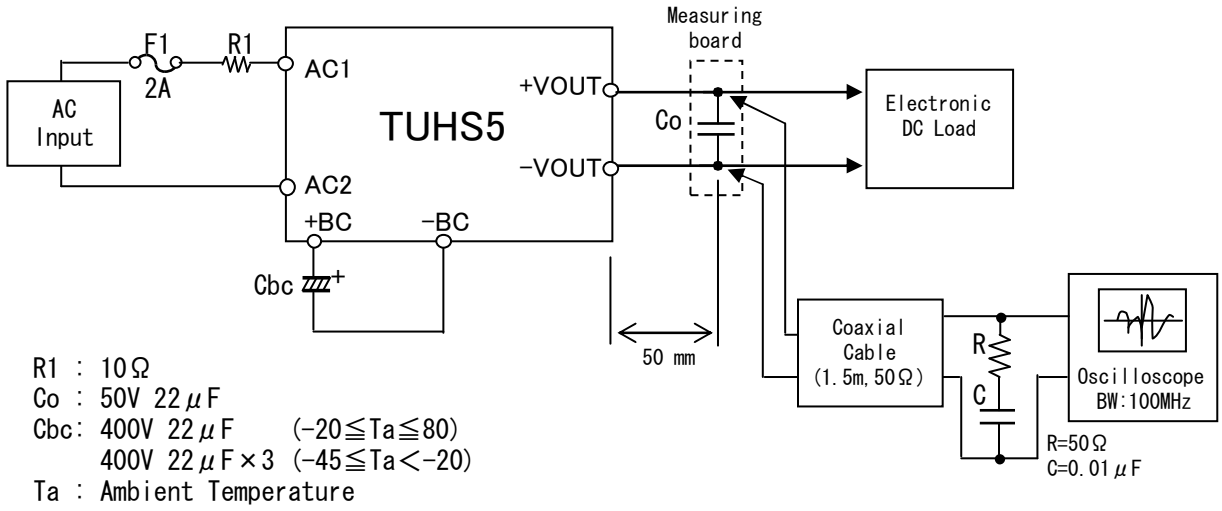


Figure B (IEC60950-1)



R1 : 10Ω
Co : 50V 22μF
Cbc: 400V 22μF (-20≦Ta≦80)
400V 22μF×3 (-45≦Ta<-20)
Ta : Ambient Temperature

Figure C